SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-40

Name: North Island Lake **Counties**: Minnehaha, McCook
Legal Description: T104N-R 52W-Sec. 19, T104-R 53-Sec 24-25
Location from nearest town: 10 miles west of Colton, SD

Dates of present survey: July 16-18, 2007
Dates of last survey: July 18-20, 2005

Primary Game Species	Other Species
Walleye	Northern Pike
Yellow Perch	Black Crappie
Largemouth Bass	Green Sunfish
	Black Bullhead
	Bluegill

PHYSICAL DATA

Surface area: 375 acres **Watershed area:** Unknown acres
Maximum depth: 17 feet **Mean depth:** 13 feet
Volume: 4,922 acre-feet **Shoreline length:** 4.4 miles
Contour map available: Yes **Date mapped:** 1997
Lake elevation observed during the survey: 1 foot low
Beneficial use classifications: (5) Warmwater semi-permanent fish propagation, (7) immersion recreation, (8) limited-contact recreation, (9) fish and wildlife propagation, recreation and stock watering.

Introduction

Island Lake is a natural lake that lies on the McCook/Minnehaha County line. It was named for the numerous islands present during lower water years. County Highway 110 divides the lake into two sections that are managed separately and named North and South Island lakes. Culverts underneath the road used to allow fish passage between the lakes but we believe they were covered by rock when the road was raised in the mid-90's. Island Lake has a small, local watershed with no inlet or outlet streams. It is one of the few lakes in Eastern South Dakota that has not been populated by common carp.

Ownership of Lake and Adjacent Lakeshore Properties

North Island Lake is not meandered public water. The South Dakota Department of Game, Fish and Parks (GFP) and the United States Fish and Wildlife Service (USFWS) share ownership of most of the lake basin and surrounding shoreline. The extreme northeast, southwest and northwest portions of the lake are privately owned.

Fishing Access

The North Island Lake Access Area is currently in poor condition. High water levels have eroded much of the shoreline and the boat ramp is entirely under water. Small boats can still be launched but parking is limited. Shore fishermen frequently park along the county road to fish. Some shore fishing is available on the USFWS land on the north end of the lake.

Field Observations of Water Quality and Aquatic Vegetation

The water in North Island Lake was very clear during the survey with a Secchi depth measurement of 1.5 meters (60 in). There were large beds of sago pondweed (*Potamogeton pectinatus*) and clasping leaf pondweed (*Potamogeton richardsonii*) around the entire lake. There is some cattail (*Typha spp.*) and bulrush (*Scirpus spp.*) in the bays on the north end of the lake.

BIOLOGICAL DATA

Methods:

North Island Lake was sampled on July 16-18, 2007 with four overnight gill-net sets and ten overnight trap-net sets. The trap nets are constructed with 19-mm-bar-mesh (¾ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh (½, ¾, 1, 1¼, 1½, and 2 in) monofilament netting. Sampling locations are displayed in Figure 4.

Results and Discussion:

Gill Net Catch

Black bullhead (75.7%) and walleye (12.2%) were the most common species sampled in the gill nets (Table 1). Yellow perch, smallmouth bass, and green sunfish were also sampled.

Table 1. Total catch from four overnight gill net sets at North Island Lake, Minnehaha County, July 16-18, 2007.

Species	Number	Percent	CPUE[1]	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	143	75.7	35.8	±12.2	162.8	17	0	105
Walleye	23	12.2	5.8	±2.3	5.4	0	0	89
Yellow Perch	14	7.4	3.5	±2.9	58.7	7	7	112
Smallmouth Bass	6	3.2	1.5	±1.2	0.0	--	--	--
Green Sunfish	3	1.6	0.8	±0.6	0.1	--	--	--

* 5 years (1997, 1999, 2001, 2003, 2005)

[1] See Appendix A for definitions of CPUE, PSD, and mean Wr.

Trap Net Catch

Black bullheads (98.3%) were the most common species sampled in the trap nets (Table 2). Green sunfish, walleye, smallmouth bass, bluegill, yellow perch, northern pike, common carp and white sucker were also sampled.

Table 2. Total catch from ten overnight trap net sets at North Island Lake, Minnehaha County, July 16-18, 2007.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	3,885	98.3	388.5	±153.2	850.5	18	3	104
Green Sunfish	38	1.0	3.8	±4.2	0.0	5	0	124
Walleye	8	0.2	0.8	±0.5	0.9	--	--	--
Smallmouth Bass	8	0.2	0.8	±0.6	0.0	--	--	--
Bluegill	4	0.1	0.4	±0.3	0.6	--	--	--
Yellow Perch	4	0.1	0.4	±0.2	9.6	--	--	--
Northern Pike	3	0.1	0.3	±0.2	0.6	--	--	--
Common Carp	1	0.0	0.1	±0.1	0.0	--	--	--
White Sucker	1	0.0	0.1	±0.1	0.1	--	--	--

* 5 years (1997, 1999, 2001, 2003, 2005)

Walleye

Management objective: Maintain a walleye fishery with a gill-net CPUE of at least 15 and PSD range of 30-60.

Walleye gill-net CPUE remained far below the management objective and the sample was comprised almost entirely of small fish ranging in length from 19 to 33 cm (7.5-13.0 in.) with an average length of 24.9 cm (10.2 in.). The absence of larger walleyes in the sample was surprising because larger walleyes (> 35.6 cm or 14 inches) were commonly caught by anglers in the spring and fall of 2007. Excellent numbers of larger fish were also caught with trap nets in the spring of 2006. This leads us to believe that summer gill nets may not be as effective for sampling walleyes in Island Lake and that spring trap netting may be needed to more accurately assess the population.

The presence of walleyes from the unstocked 2000 to 2006 year classes indicates consistent but limited natural reproduction (Table 4). Walleye abundance was not much higher when fingerlings were stocked from 1996-99 (Table 3).

Table 3. Walleye gill-net CPUE, PSD, RSD-P, and mean Wr for North Island Lake, Minnehaha County, 1997-2007.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2007	Mean*
CPUE	6.3		8.0		8.0		1.0		3.8	5.8	5.4
PSD	5		0		70		--		53	0	32
RSD-P	0		0		15		--		40	0	14
Mean Wr	90		90		92		--		81	89	88

*5 years (1997, 1999, 2001, 2003, 2005)

Table 4. Average back-calculated lengths (mm) for each age class of walleye in North Island Lake, Minnehaha County, 2007.

			Back-calculation Age							
Year Class	Age	N	1	2	3	4	5	6	7	8
2006	1	22	169							
2005	2	1	149	274						
All Classes		**23**	**168**	**274**						
Statewide Mean			168	279	360	425	490			
Region III Mean			173	281	367	435	517			
LLI* Mean			169	280	358	425	494			

*Large Lakes and Impoundments (>150 acres)

Yellow Perch

Management objective: Maintain a yellow perch fishery with a gill-net CPUE of at least 25.

Yellow perch abundance has been below the management objective since 2003(Table 5). The fish sampled in 2007 ranged in length from 15-25 cm (5.9-10.0 in). The 2007 spring stocking of 3,420 juvenile perch (Table 9) did not increase gill net CPUE (Table 5).

Table 5. Yellow perch gill-net CPUE, PSD, and mean Wr for North Island Lake, Minnehaha County, 1997-2007.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2007	Mean*
CPUE	6.7		80.0		140.2		57.5		9.3	3.5	58.7
PSD	35		16		39		20		68	7	36
RSD-P	15		7		7		6		3	7	8
Mean Wr	114		118		108		106		109	112	111

*5 years (1997, 1999, 2001, 2003, 2005)

Black Bullhead

Management objective: Maintain a black bullhead population with a trap-net CPUE of 100 or less.

Black bullhead trap-net CPUE continues to exceed the management objective (Table 6) and the fish have an average length of only 173 mm (6.8 in.). The length-frequency histograms (Figure 2) reflect the cyclic nature of the population.

Table 6. Black bullhead trap-net CPUE, PSD, and mean Wr for North Island Lake, Minnehaha County, 1997-2007.

	1997	1998	1999	2000	2001	2002	2003	2005	2007	Mean*
CPUE	2,838		598.1		345.9		214.4	256.0	388.5	850.5
PSD	0		96		53		32	48	18	46
RSD-P	0		0		7		12	3	3	4
Mean Wr	--		--		--		84	100	104	92
Mean Length							196	227	173	212

*5 years (1997, 1999, 2001, 2003, 2005)

All Species

Bluegill and largemouth bass were introduced in 2003 to take advantage of improved habitat conditions (Table 7). A few bluegills were sampled in 2005 and 2007 but the population is not well established at this time. Smallmouth bass were introduced in 2007 because of abundant crayfish and ideal habitat conditions. Some smallmouth bass were sampled in each gear type. One common carp was sampled for the first time this year.

Table 7. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in North Island Lake, Minnehaha County, 1999-2007.

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007
COC (GN)	--		--		--		--		--
COC (TN)	--		--		--		--		0.1
WHS (GN)	0.5		--		--		--		--
WHS (TN)	--		--		--		0.4		0.1
BLB (GN)	140.5		43.0		220.0		83.0		35.8
BLB (TN)	598.1		345.9		214.4		256.0		388.5
NOP (GN)	1.0		0.2		--		--		--
NOP (TN)	0.1		0.1		0.4		1.9		0.3
GSF (GN)	--		--		--		0.3		0.8
GSF (TN)	0.2		2.1		0.7		--		3.8
BLG (GN)	--		--		--		0.3		--
BLG (TN)	--		--		--		2.9		0.4
SMB (GN)	--		--		--		--		1.5
SMB (TN)	--		--		--		--		0.8
LMB (GN)	--		--		--		--		--
LMB (TN)	--		--		--		0.1		--
YEP (GN)	80.0		140.2		57.5		9.3		3.5
YEP (TN)	3.4		39.9		4.3		0.2		0.4
WAE (GN)	8.0		8.0		1.0		3.8		5.8
WAE (TN)	0.4		0.8		0.3		2.3		0.8

COC (Common Carp), WHS (White Sucker), BLB (Black Bullhead), NOP (Northern Pike), GSF (Green Sunfish), BLG (Bluegill), SMB (Smallmouth Bass), LMB (Largemouth Bass), YEP (Yellow Perch), WAE (Walleye).

MANAGEMENT RECOMMENDATIONS

1. Continue to conduct biennial lake surveys to monitor the fishery. Attempt a spring trap netting survey to sample the walleye population and compare the results with summer gill nets samples. Recommend a walleye sampling strategy based on the results of the comparison.

2. Reduce black bullhead density by commercial fishing, predator management and removal projects.

3. Stock additional smallmouth bass and monitor development of the population by fall electrofishing.

4. The yellow perch juveniles stocked in 2007 were marked with oxytetracycline, a chemical that causes bone to fluoresce under a certain wavelength of light. Collect a sample of yellow perch during spring trap netting to check for OTC marks.

5. Investigate the possibility of improving the access area.

Table 8. Stocking record for North Island Lake, Minnehaha County, 1991-2007.

Year	Number	Species	Size
1991	25,910	Walleye	Fingerling
	4,336	Walleye	Lrg. Fingerling
	11	Walleye	Adult
1992	26,300	Yellow Perch	Fingerling
	1,012	Yellow Perch	Adult
1993	25,000	Walleye	Fingerling
	30,690	Yellow Perch	Fingerling
1995	25,780	Yellow Perch	Fingerling
1996	27,000	Walleye	Fingerling
1997	28,800	Walleye	Fingerling
	2,690	Yellow Perch	Fingerling
1998	25,000	Walleye	Fingerling
	1,243	Yellow Perch	Adult
	18,590	Yellow Perch	Fingerling
1999	25,000	Walleye	Fingerling
	1,065	Yellow Perch	Adult
	2,522	Yellow Perch	Juvenile
2000	13,380	Yellow Perch	Juvenile
2003	26,650	Bluegill	Fingerling
	44,010	Largemouth Bass	Fingerling
2004	1,248	Bluegill	Adult
	25,010	Largemouth Bass	Fingerling
	294	Northern Pike	Adult
	410	Walleye	Juvenile
2005	45,100	Walleye	Fingerling
	25,317	Yellow Perch	Fingerling
	77	Yellow Perch	Adult
2007	164	Smallmouth Bass	Adult
	3,224	Walleye	Large Fingerling
	3,420	Yellow Perch	Juvenile

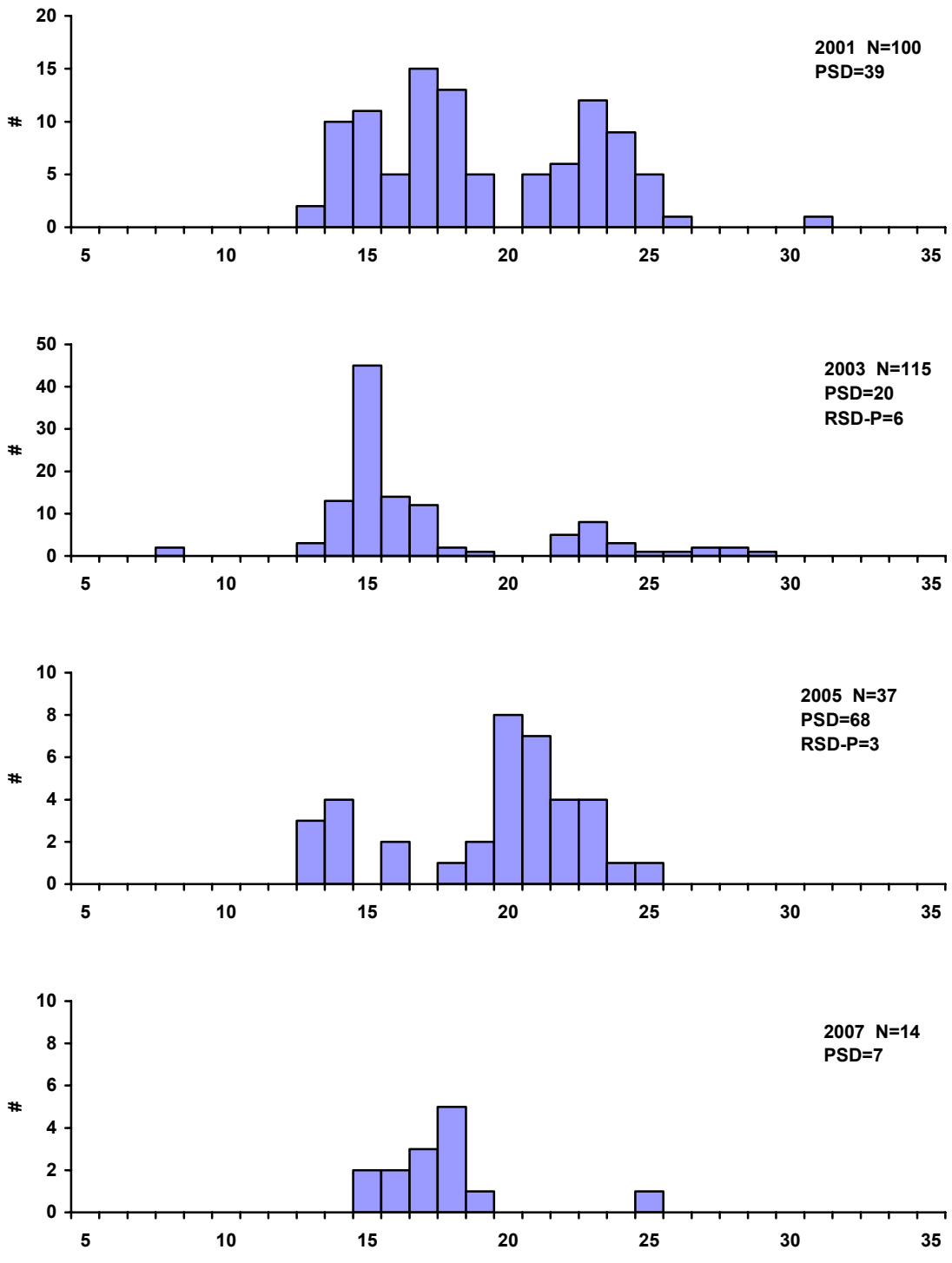

Figure 1. Length frequency histograms for yellow perch sampled with gill nets in North Island Lake, Minnehaha County, 2001, 2003, 2005, and 2007.

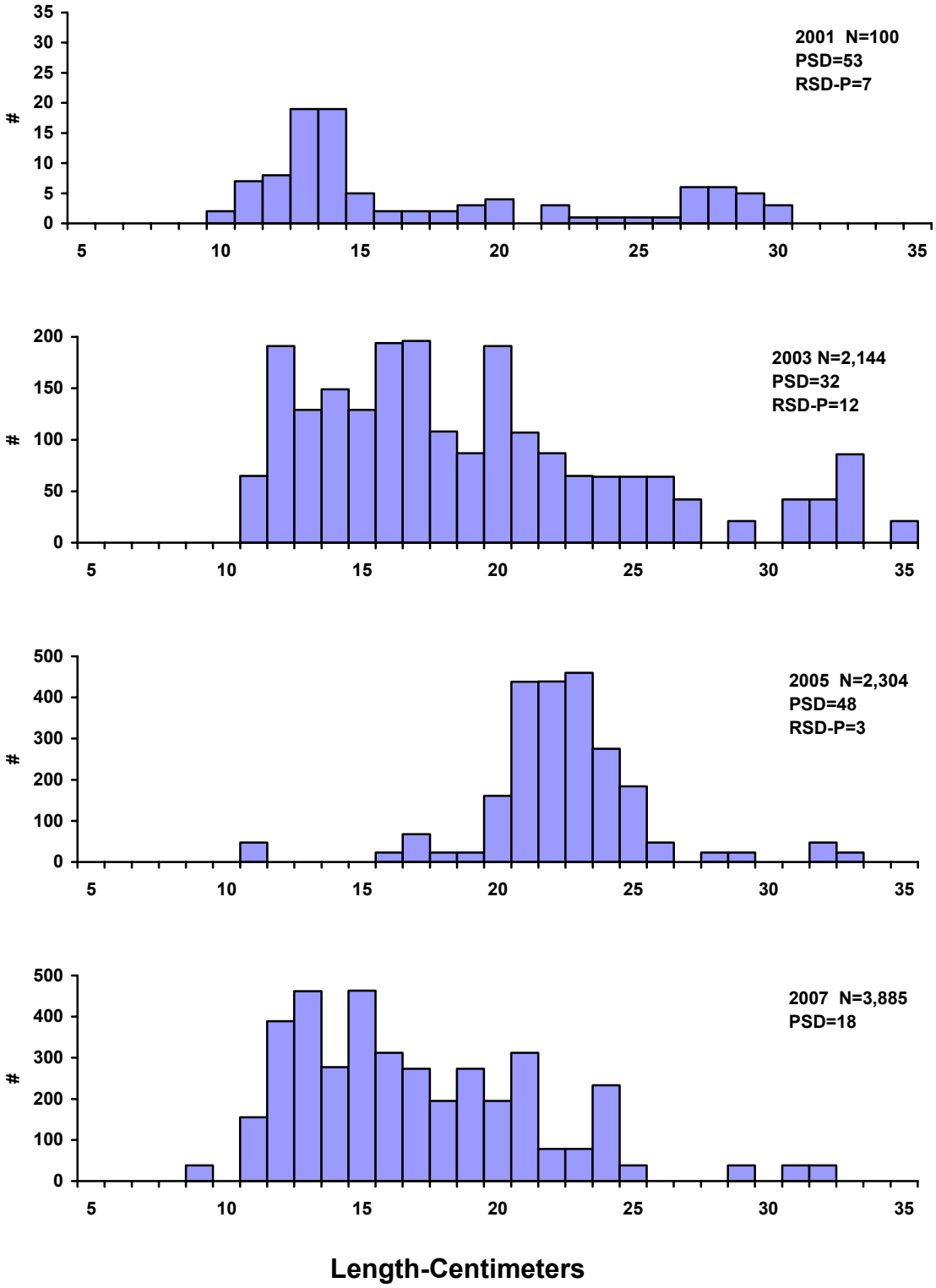

Figure 2. Length frequency histograms for black bullheads sampled with trap nets in North Island Lake, Minnehaha County, 2001, 2003, 2005, and 2007.

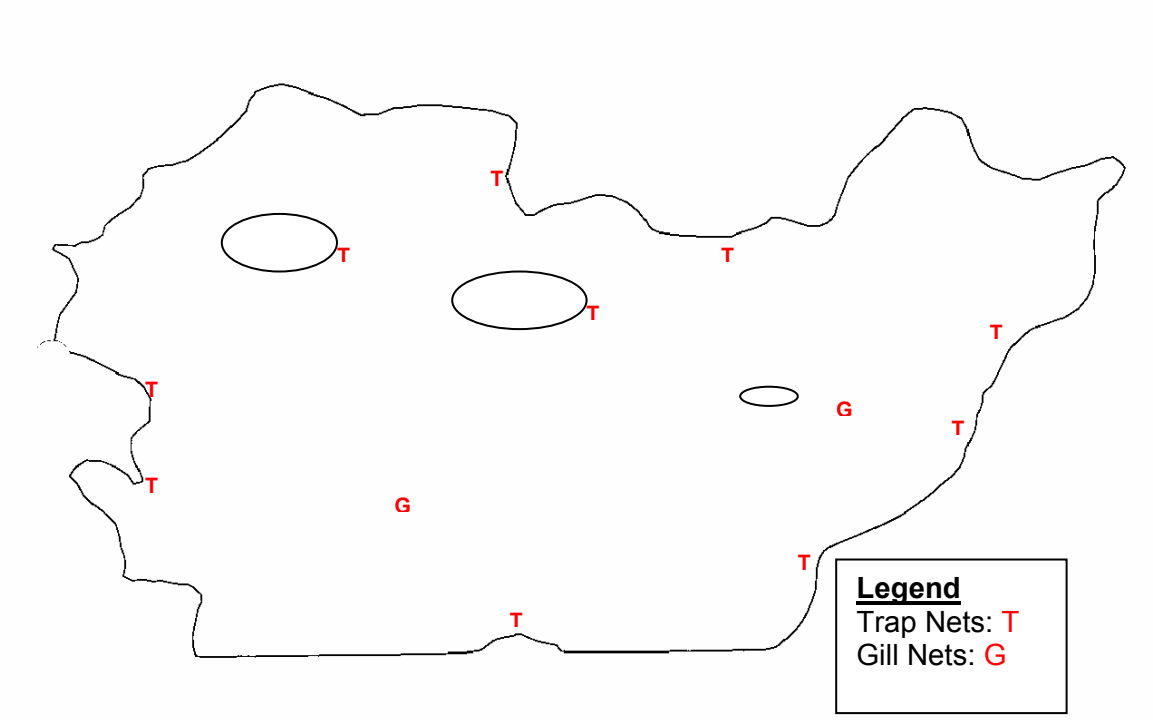

Figure 3. Sampling locations on North Island Lake, Minnehaha County, 2007.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.